



Family Health  
Services Division

# Maternal Diabetes and Pregnancy

## Pregnancy Risk Assessment Monitoring System Hospital Discharge Data

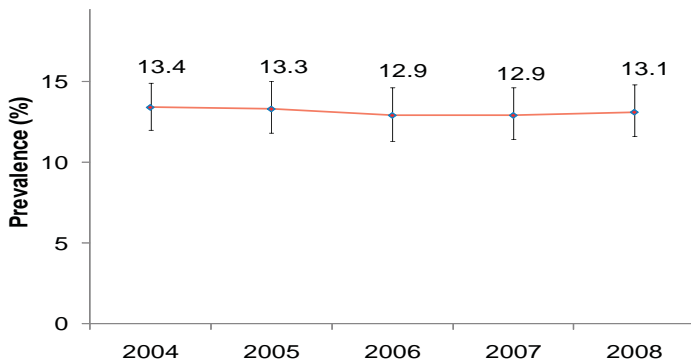
### Maternal Diabetes and Pregnancy

Diabetes is a common chronic condition with significant health effects. Traditionally, it has been associated with older individuals, although diabetes related to pregnancy has also been of interest due to the impact on a pregnancy. Infants of diabetic mothers may face serious health consequences, such as low birth weight, preterm delivery, macrosomia, and increased risk for congenital anomalies.<sup>1,2</sup> Additionally, mothers with diabetes are more likely to have complications necessitating a cesarean delivery during childbirth.<sup>1,2</sup> Women diagnosed with gestational diabetes have a seven-fold greater risk of developing chronic diabetes later in life, compared to those who did not have gestational diabetes.<sup>3</sup> Even those with just an abnormal glucose screen in pregnancy (but normal follow up testing for gestational diabetes) are at increased risk for development of diabetes later in life.<sup>4</sup> The American Diabetes Association recommends screening six to twelve weeks postpartum and then every three years to identify those who develop chronic diabetes as early as possible.

### Data Highlights

- Overall, 13.1% of mothers with a recent live birth have diabetes
- Diabetes was high in mothers who indicated a race of Other Asian, Chinese, Filipino, Korean, Other Pacific Islander, Samoan, Japanese, and Hawaiian
- Mothers > 35 years of age, those with some college education, self-pay insurance, and those living in Hawai'i County had the highest estimates
- Mothers with diabetes were more likely to have a cesarean delivery, a preterm delivery, and have high blood pressure during pregnancy
- Mothers with diabetes were more likely to report symptoms suggestive of postpartum depression and fair/poor general health status
- Mothers with diabetes had higher hospital charges for both mother and infant

Trends in Diabetes, Hawai'i PRAMS 2004-2008



### Trends in Diabetes

The prevalence of diabetes (chronic & gestational) among mothers giving birth in the state has remained stable since 2004 with a proportion of about 13%. There also has been little change in the estimates of chronic diabetes (2%) and gestational diabetes (11%) since 2004.

#### About the Data

The Hawai'i Pregnancy Risk Assessment Monitoring System (PRAMS) is a self-reported survey of recent mothers conducted by mail with telephone follow-up. It is designed to monitor the health and experiences of women before, during, and just after pregnancy. Every year, about 2,000 women who deliver a live infant in Hawai'i are randomly selected to participate. For this analysis diabetes was defined by 1) a report of diabetes or high blood sugar before the current pregnancy; 2) diabetes or high blood sugar with onset in the pregnancy; and 3) report of diabetes on the birth certificate. Unfortunately, the PRAMS and birth certificate data does not allow differentiation of the type of diabetes.

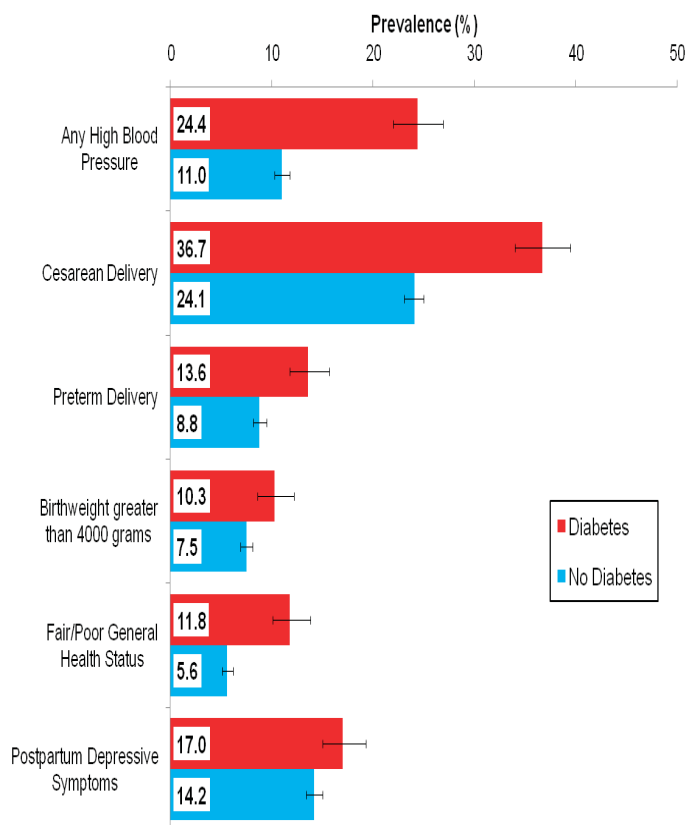
#### Suggested Citation

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### Outcomes Associated with Diabetes

Mothers with diabetes are more likely to have a cesarean delivery, a preterm delivery (<37 weeks gestation), and have high blood pressure compared to mothers without diabetes. They were also more likely to have a baby weighing more than 4000 grams, report a fair/poor general health status and symptoms of postpartum depression.

Outcomes Associated with Diabetes, Hawai'i PRAMS 2004-2008



## Characteristics of Mothers with Maternal Diabetes and Pregnancy, Hawai'i PRAMS 2004-2008

	Prevalence (%)	95% CI*
<b>Maternal Race</b>		
White	8.2	(7.0-9.5)
Black	13.7	(12.3-15.3)
Hispanic	16.5	(14.5-18.6)
Hawaiian	16.0	(14.5-17.7)
Samoaan	14.0	(12.1-16.2)
Other Pacific Islander	10.6	(6.8-16.1)
Filipino	15.8	(13.0-19.1)
Japanese	17.8	(12.6-24.6)
Chinese	14.8	(10.8-19.9)
Korean	14.8	(11.6-18.8)
Other Asian	10.4	(6.5-16.3)
<b>Maternal Age</b>		
under 20 years	7.1	(5.3-9.5)
20-24 years	8.2	(7.1-9.5)
25-34 years	14.3	(13.3-15.3)
35 or more years	19.4	(17.6-21.3)
<b>Maternal Education</b>		
<High School	12.1	(9.8-14.8)
High School	12.9	(11.8-14.1)
Some College	14.8	(13.4-16.2)
College Graduate	12.4	(11.2-13.7)
<b>Marital Status</b>		
Married	14.1	(13.3-15.0)
Other	11.4	(10.3-12.6)
<b>Prenatal Insurance Coverage</b>		
None	16.0	(11.3-22.3)
QUEST/Medicaid	12.1	(10.7-13.5)
Private Insurance	13.6	(12.8-14.5)
<b>Pre-pregnancy Weight Status</b>		
Underweight (BMI <18.5)	7.9	(6.0-10.4)
Normal (BMI 18.5- 24.9)	9.7	(9.0-10.6)
Overweight (BMI 25.0-29.9)	14.9	(13.4-16.6)
Obese (BMI >=30.0)	23.6	(21.3-25.9)
<b>County of Residence</b>		
Hawaii	14.1	(12.1-16.3)
Honolulu	13.2	(12.4-14.0)
Kauai	11.9	(9.2-15.3)
Maui	12.2	(10.3-14.5)
<b>Overall</b>	<b>13.1</b>	<b>(12.5-13.8)</b>

\* 95% CI refers to the 95% confidence interval around estimate.

### Maternal Characteristics

All other groups reported a higher prevalence of diabetes compared to whites, except for blacks and Hispanics. Diabetes increased with maternal age group with the highest estimate among those 35 or more years of age. Mothers with some college education showed higher estimates than other groups. Married women and those who had no insurance coverage for prenatal care showed higher estimates. Women who lived in Hawai'i County had somewhat higher estimates, compared to other counties in the State. Overweight and obese women prior to conception had high estimates of diabetes.

#### For More Information Contact:

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### Hospital Charges

Analyses of hospital discharge data from 2004-2008, demonstrated that the median total hospital charges among women with diabetes who had a baby was significantly higher compared to those without diabetes. There was a similar pattern observed by method of delivery. The median charge per day for both newborns and mothers was higher compared to births when the mother did not have diabetes.

#### Median Hospital Charges by Maternal High Blood Pressure Status, Hospital Discharge 2004-2008

	Mothers with Diabetes (\$)	Mothers without Diabetes (\$)
Median Total Charges		
Overall	11,275	9,210
Cesarean Delivery	14,222	13,208
Vaginal Delivery	9,231	8,238
Newborn Charge per day	1,043	1,015
Maternal Charge per day	3,316	3,196

### Discussion

There are significant disparities in diabetes among several groups. In particular, all Asian and Pacific Islander subgroups, those 35 years of age or more, and those who are overweight or obese have high rates of diabetes. Diabetes is related to higher hospital charges and is associated with increased risks for cesarean delivery, preterm delivery, high blood pressure, and reporting a fair/poor general health status.

Diabetes during pregnancy is a common condition as well as a significant risk factor for chronic diabetes. The cumulative effects of improper nutrition, excess caloric intake, lack of exercise, genetics, and other factors play a roll in the development of diabetes in mothers, as in the general population. In addition to focusing on glucose control during the pregnancy, it is important to ensure appropriate follow up and counseling about the lifetime risks of diabetes and associated conditions in the post partum period. It is equally important to reduce the rates of diabetes in women prior to pregnancy and to encourage all women to make healthy lifestyle choices.

### References

- 1 Luke B, Brown MB. Elevated risks of pregnancy complications and adverse outcomes with increasing maternal age. *Human Reproduction*. 2007; 22(5):1264-72.
- 2 Vivet-Lefebure A, Roman H, Robillard PY, Laffitte A, Hulsey TC, Camp G, Marpeau L, Barau G. Obstetrical and neonatal outcomes of gestational diabetes mellitus at Reunion Island. *Gynecol Obstet Fertil*. 2007; 35(6):530-5.
- 3 Bellamy, L. et al. Type 2 diabetes mellitus after gestational diabetes: a systematic review and meta-analysis. *Lancet*. 2009; 373(9677): 1773-9.
- 4 Retnakaran R, Shah BR. Abnormal screening glucose challenge test in pregnancy and future risk of diabetes in young women. *Diabetic Medicine*. April 2009; 26(5):474-477.

#### About the Data

Hospital discharge data was furnished by the Hawai'i Health Information Corporation which is a private, not for profit corporation that maintains data on all emergency room and hospitalizations in the state. For this analysis, maternal and newborn discharge records were analyzed for 92,346 births from 2004-2008. The International Statistical Classification of Diseases (ICD-9) Diabetes was defined by a maternal code of 250, 648.0, 648.8, or a newborn code of 775.0. Total charges were calculated by summation of maternal and infant charges. Charge per day was calculated from charges and length of stay.